



# Good morning

Twitter: #math4theNines

Wiki space for resources:

[9appliedsummerinstitute.wikispaces.com](http://9appliedsummerinstitute.wikispaces.com)

Enhancing Teaching and  
Learning in Grade 9 Applied  
Mathematics:  
Summer Conference – Day 2

Day 2			
Time	Activity	Location	Facilitator/Presenter
9:00 – 9:30	Effective ways to engage in professional learning as a team	Plenary Room	Dr. Chris Suurtamm
9:30– 10:15	Panel discussions on the ways that teams worked	Break out rooms	School teams
10:15 – 10:30	Break		
10:30 – 11:00	Conference participants sharing and planning	Plenary Room	Dr. Chris Suurtamm
11:00 - 12:00	Plenary: Five practices presentation	Plenary Room	Dr. Martha Koch
12:00 – 1:00	Lunch		
1:00 – 2:15	Workshops on variety of classroom practices	Breakout rooms	School teams
2:15 – 2:30	Break		
2:30– 2:45	Conference participants sharing and planning		Dr. Chris Suurtamm
2:45 – 4:00	Where do we go from here? Facilitated next steps	Plenary Room	Dr. Chris Suurtamm Kaye Appleby

**WHAT ARE SOME THINGS WE KNOW  
ABOUT PROFESSIONAL LEARNING?**

# Key elements of sound professional learning for mathematics

- **Curriculum-based** (Cohen & Hill, 1998; CPRE, 1998)
- **Focusing on student thinking** (Fennema et al., 1996; Kennedy, 1998).
- **Collaborative**, within **supportive** school and district environments (Elmore & Burney, 1997; Joyce et al., 1993; Little, 1982; Rosenholtz, 1991).
- **Aligns** with other elements in the **system**, e.g., assessment, curriculum, administrative support (Cohen & Hill, 1998; CPRE, 1998; Kahle, 1999)

(Loucks-Horsley and Matsumoto, 1999)

# The value of Dialogue and Collaboration

To what extent have the following resources or learning opportunities helped your implementation of the mathematics curriculum in this Grade 9 or 10 class?

	Somewhat/A lot
Mathematics textbooks	77%
Dialogue with colleagues	77%
Ministry curriculum documents	57%
Other teacher resource books	36%
Professional development workshops	36%

# Possible activities for school PLCs

- Lesson study
  - Working with the curriculum, research, & resources, teachers work together to design a lesson and implement it in different classrooms
  - Other teachers observe student learning and debrief
  - All teachers work together to make adjustments to the lesson

- Collaborative work
- Focus on curriculum & the continuum
- Focusing on student thinking

# Possible activities for school PLC

- Working together to examine student work
  - written and video recorded;
  - examine and discuss student thinking & next steps

- Collaborative work
- Focus on curriculum
- Focusing on eliciting, supporting, and sharing student thinking

# Possible activities for school PLC

- Book study
  - Research-based work that is connected to practice
  - May have samples of student work, lessons, etc. to discuss
  - Connections between pedagogy, math, & practice

- Collaborative work
- Focusing on eliciting, supporting, and sharing student thinking
- Connecting resource to curriculum builds curriculum knowledge
- Draws on expertise in topic – knowledgeable other

# Ways our teams worked

# Teams determined

- Their problem of practice
- When they would meet
- Ways in which they would work
- What they would do when they got together

To different extents – Teams worked in various ways

Teams differed in  
how they worked and  
how their learning  
was facilitated

- Format
- Team dynamic
- Activities
- Team support

# Format

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- Some schools structured the meetings in a fairly formal way with set agendas, learning goals, and tasks.
- Other teams were less formal and came together and spent the meeting time working on different things that seemed appropriate to them at the time.

# Team dynamic

- Some teams had a facilitator who would set the agenda and prepare activities for the meeting - the Math Board Lead(s), the Department Head, the Administrator, or outside facilitator.
- Some teams had a distributed leadership approach.
- For most teams, attendance at the team meetings was consistent except for administrative team members who might be called away for a school emergency.

# Team activities

- classroom observations
- co-teaching
- lesson studies
- book studies
- co-designing new tasks
- moderated marking
- examining data
- anticipating students' responses.
- examining students' thinking through responses to tasks,
- participating in interviews with students, or
- examining video recording of lessons and/or students' thinking.
- conversations with teachers from other grades or schools

Teachers determining what they wanted to work on and ways to work was key

# Book studies



- Building on student thinking
- Building algebraic reasoning
- Comparing student strategies

# The Border Problem:

How many squares are shaded?

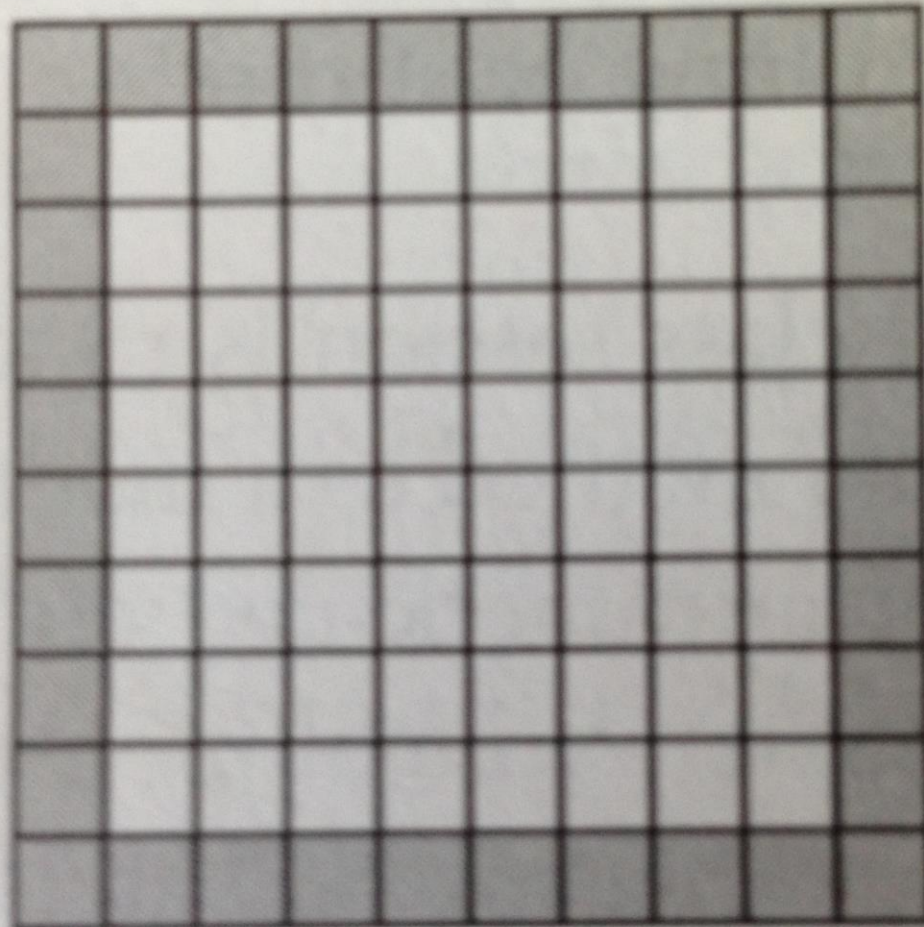
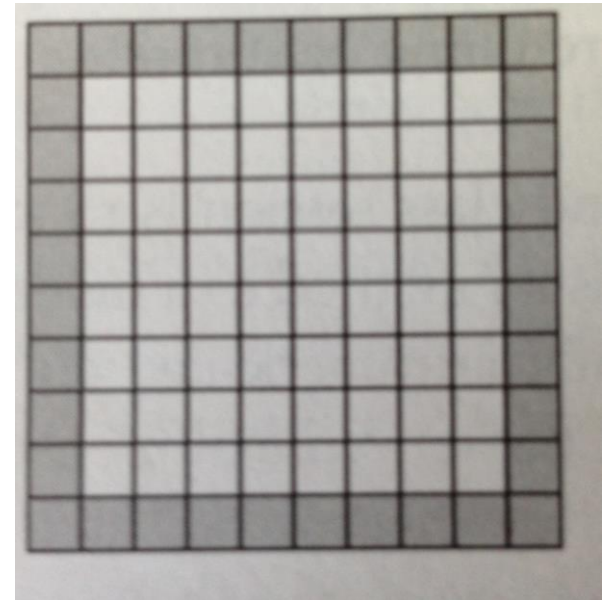


Figure  
C. Suurtamin

# Different representations

- Sharmeen  $4 \times 10 - 4$
- Colin  $10 + 9 + 9 + 8$
- Joe  $10 + 10 + 8 + 8$
- Melissa  $10 \times 10 - 8 \times 8$
- Tina  $4 \times 9$
- Zack  $4 \times 8 + 4$

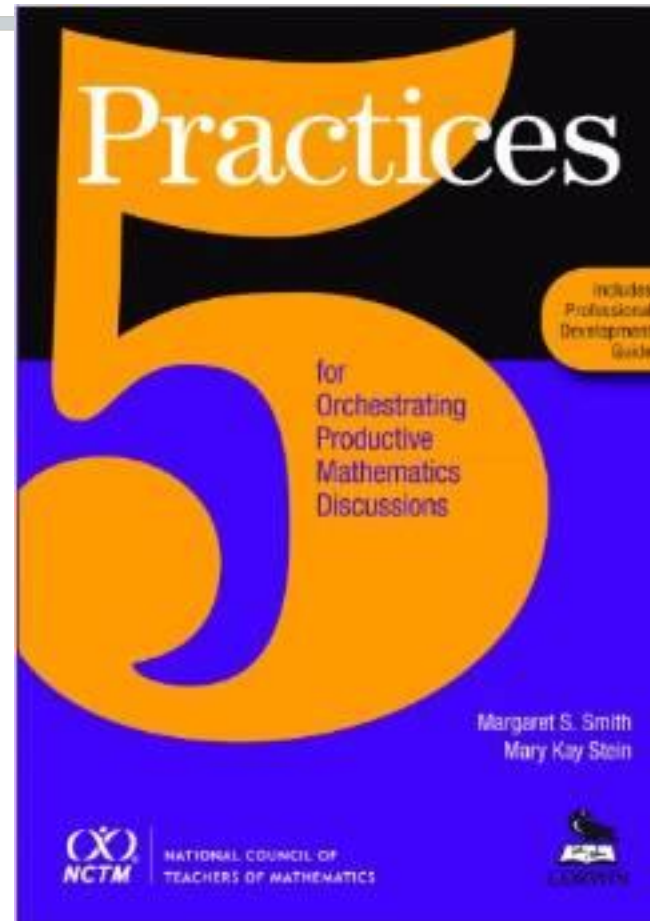


Now try a  $6 \times 6$

How do these expressions change?

# The **5 Practices** for Orchestrating productive mathematics discussions

- Anticipating
- Monitoring
- Selecting
- Sequencing
- Connecting



Smith & Stein, 2011

# Effective PLC strategies

- Focus on what teachers would like to work on
- Connect to classroom practice – co-planning, co-designing, etc.
- Move the learning in and out of the classroom – examining student thinking, trying out tasks, etc.
- Respectful dialogue is key
- Gain access to resources, people, etc. to spark new ideas – books, monographs, twitter, workshops, webinars
- Strive for shared leadership
- Changes in practice – take time – plan for sustained learning

# Breakoutson ways that teams worked

- Working across the grades
- Use of 5 Practices
- Planning through curriculum analysis and developing assessments
- Examining student thinking
- Role of dialogue in a PLC
- Extending professional learning beyond the PLC
- Lesson Study, co-planning, co-teaching

# Breakout groups

Ticket #	Location
1	London A
2	London B
3	Balmoral A
4	Balmoral B
5	Kensington 1
6	Kensington 2
7	Remain in ballroom

Breakouts: 9:30 – 10:15

Break 10:15 – 10:30

Return to ballroom at 10:30 and  
begin to **share and plan**

# Break

Until 10:35



## Summary of effective PLC strategies

- Focus on what teachers would like to work on
- Connect to classroom practice – co-planning, co-designing, etc.
- Move the learning in and out of the classroom – examining student thinking, trying out tasks, etc.
- Respectful dialogue is key
- Gain access to resources, people, etc. to spark new ideas – books, monographs, twitter, workshops, webinars
- Strive for shared leadership
- Changes in practice take time – plan for sustained learning

10:35 – 11:00

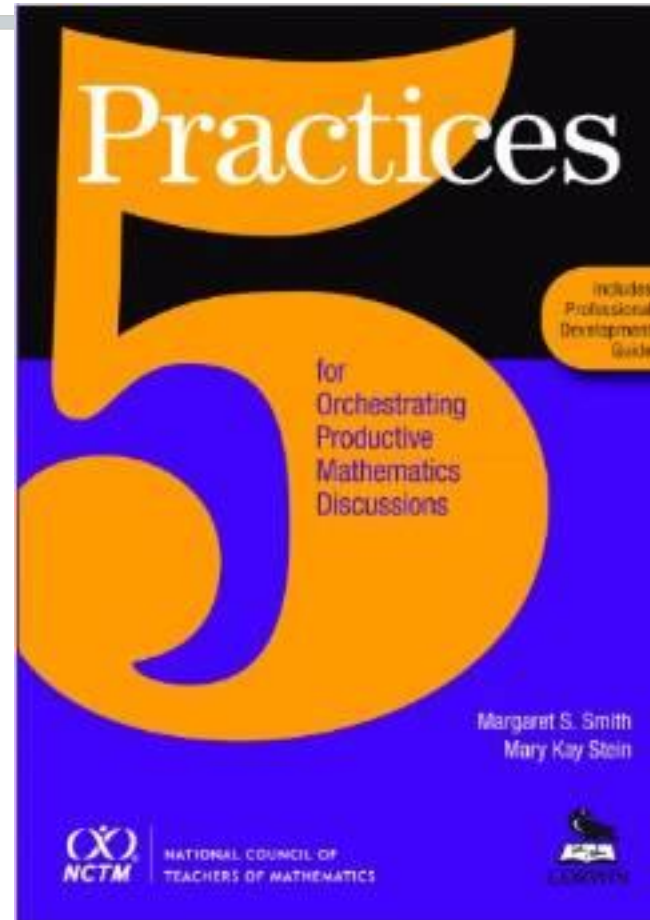
## Sharing what you learned

- Go around the table with each person sharing something they learned at their breakout group
- As a school team consider:
  - What are some ways of working that would suit your team?
  - What might this look like? What resources do you need? Who would be involved?

# Examining

**Dr. Martha Koch**

**University of Manitoba**



Smith & Stein, 2011

# Lunch

12:00 – 1:00

# Workshops

- You will be going to one of the following workshops:
  - Use of technology
  - Rearranging the curriculum
  - Design, implementation, and use of rich tasks and projects
  - Ways to engage students and make thinking visible
  - Building a continuum of learning across grades
  - Development of learning goals, success criteria, and other assessment strategies

If your school team took the odd numbers yesterday, today take the even ones.

# Workshops

- You will be going to one of the following randomly selected workshop
  - Use of technology (5)
  - Rearranging the curriculum (4)
  - Design, implementation, and use of rich tasks and projects (6)
  - Ways to engage students and make thinking visible (3)
  - Building a continuum of learning across grades (2)
  - Development of learning goals, success criteria, and other assessment strategies (1)

If your school team took the odd numbers yesterday, today take the even ones.

Be ready to report back to your team and table mates about the workshop

Bring your  
white boards!

# Tickets and rooms

One school team should  
take the odd numbers, the  
other the even – we will  
switch tomorrow

Ticket Number	Room
1	London A
2	London B
3	Balmoral A
4	Balmoral B
5	Ballroom - bring iPad
6	Kensington 1/2

Workshops run from 1:00  
until 2:15  
Break and sharing from  
2:15 - 2:30  
Return at 2:30 to  
ballroom for next steps

# Break and sharing until 2:30

Share your workshop experience with your school team members

- What did you experience?
- What ideas might be useful to your school, classroom, colleagues, students?
- How can you make this happen?

# Where do we go from here?

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Resources

Additional Supports

Your plan . . .

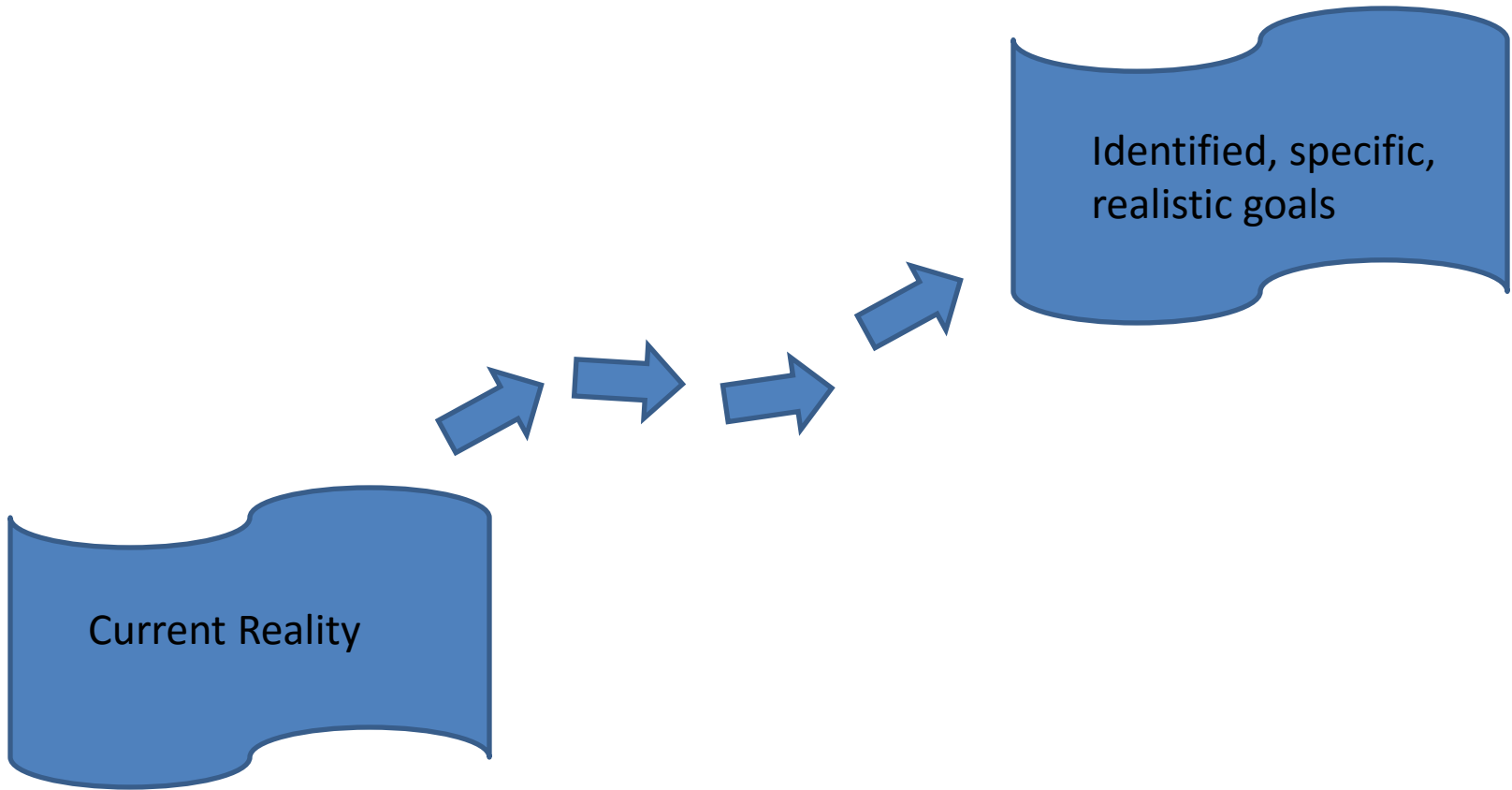
Task:

## **Develop and refine a plan that will improve Mathematics Education**

Consider:

- Target work group [e.g., department, school, family of schools, entire board]
- Roles required & responsibilities for each
- Short term [Sept-Jan] goals
- Longer term [2016-2020] goals
- Current reality
- Possible strategies
- Success criteria, checkpoints, monitoring plan
- Data needed - what? how?

# Monitoring...Assessing...Evaluating...Improving the Math program



# Assessment of Current Reality

- EQAO results
- Student data – retention rates, graduation rates, attitudes, post-grad success & paths
- Other relevant school or board data
- Video evidence
- Collaboration process? [sharing/creating resources, team assessment of student work,...]
- Learning mindset – growth? [teachers and students]
- Resources available – tech, manips, people,...
- Timetable flexibility

# When you think about your context, where is the energy?

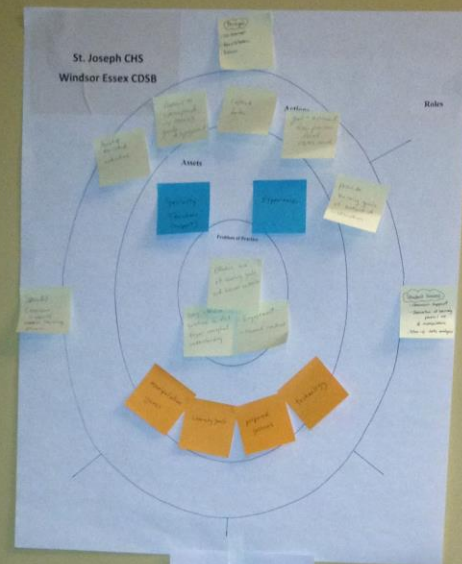
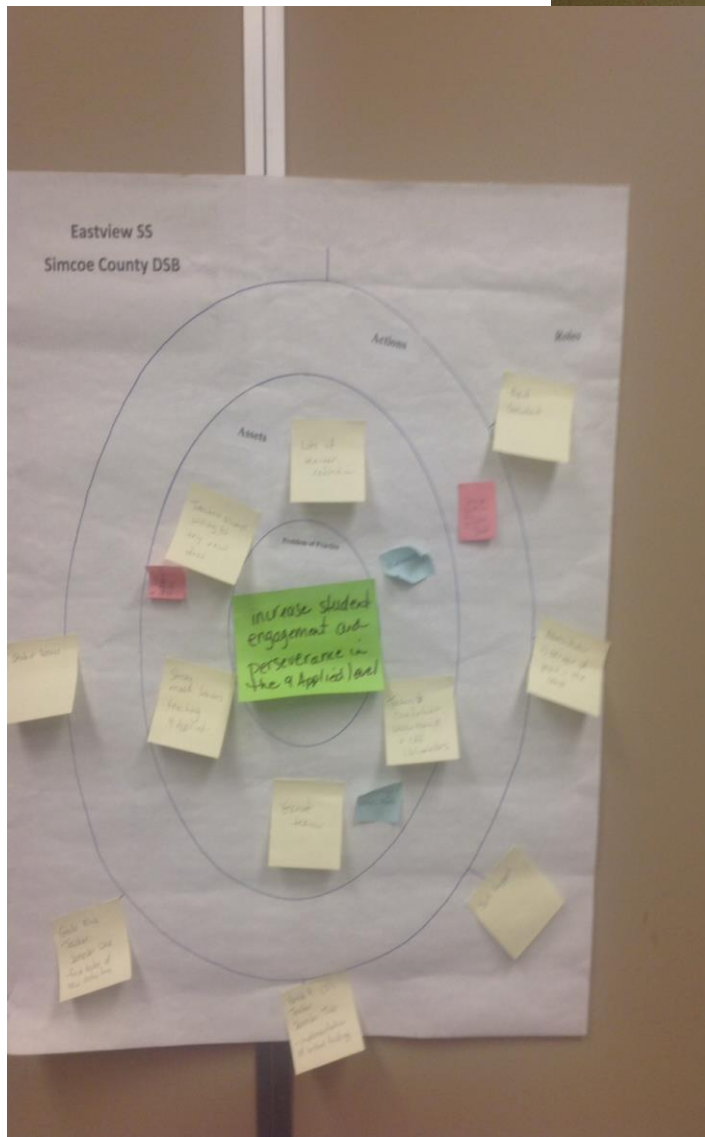
Who has “energy” to work with you?

How might you “fan a flame”?



# Fertile ground???

- What is the clearest need?
- What professional learning is required?
- Who is willing to lead/collaborate?
- How can any needed resources be accessed?



describe  
calculate  
pose  
explain  
construct  
investigate  
draw  
visualize  
formulate  
present  
create  
select  
develop  
interpret  
illustrate  
compare

simplify  
relate  
determine  
substitute  
identify  
determine  
correspond  
express  
verify  
sketch  
apply  
collect

